



USER MANUAL

for
MRU Series
With Fanuc 0iM

Revised: June 2013

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1. Safety

1.1 Intended Use

This machine is a numerically controlled machine tool designed to shape cold metal by the application of rotating cutting tools capable of performing two or more machining processes (e.g. boring, drilling, milling, thread tapping) at one set-up of a workpiece and incorporating automatic facilities to:

Select and change tools from a magazine

Change the position of the workpiece relative to the spindle mounted cutter.

Select and apply spindle speeds and axis feeds

Control ancillary services (e.g. coolant flow)

This machine is intended for use in an industrial environment and must not be used in the residential, commercial and light industrial environment.

Materials to be cut in this machine are: Steel, Iron, Iron casting, Bronze, Brass, Copper, and Aluminium.

Materials not suitable to be cut in this machine are: Graphite, Wood, Plastic, Magnesium alloy.

Consult the agent for the material not listed above.

1.2 Important Safety Notice and Warning

It is the user's responsibility to be acquainted with the legal obligations and requirements in the use and application of the machine.

1.2.1 Safe installation

It is the customer's responsibility to ensure the machine is installed in a safe operating position, with all service pipes and cables clear of the operation area so as not to cause a hazard. Access must be allowed for safe maintenance, swarf and oil disposal including safe stacking of machined and un-machined components.

1.2.2 Machine guarding

This Machine is fitted with completely enclosed guards as standard. In certain cases and tooling applications additional guarding may have to be provided by the user.

The standard machine guarding has special safety interlocks on the guard doors that comply with the Machinery Directive. Guards and interlocks must be kept fully maintained and tested by the customer and shall not be removed.

The guards are made with clear observation windows having high impact resistance to provide operator safety and a clear unobstructed view of the operations in process. The opening of any guard door provides access to potential hazard areas. Opening of the front working area guard doors is not allowed whilst the spindle is rotating but it is still possible to manually initiate axis movements whilst these doors are open albeit at a reduced traverse rate. Extreme care must therefore be used at all times.

1.2.3 Software

Unauthorized changing of machines software or control parameters is hazardous and is not permitted. The machine maker will not accept any liability whatsoever for unauthorized changes in this area.

1.2.4 Authorized personnel and training

Operating, service and maintenance engineers shall be authorized by the 'User Company' and properly trained in the use of the machine.

1.2.5 Safe working practice

Workholding devices, lifting equipment, tooling and their use shall be the responsibility of the user. It is the user's responsibility to protect against the hazards caused by swarf, leaking oil or coolant and their use.

Use of proprietary oil or coolant is the responsibility of the user. Special instructions from the suppliers concerning their use should

be carefully read and understood before use.

To prevent body injury, safe working practices should be employed when operating or servicing the machine.

1.3 Safety Cautions List

It is the user's responsibility to ensure all local regulations and safety instructions are followed.

Users should consult with their own safety representative to ensure that all such regulations are known and acted upon.

DON'T run the machine until you have made clear to your supervisor that you understand the potential hazard of spindle rotation, the throwing of coolant and the throwing of swarf from the cutting process.

DON'T run the machine until you have read and understood all manuals provided with the machine.

DON'T run the machine for the first time without a qualified instructor. Ask your supervisor for help when you need it.

DON'T get caught in moving parts. Remove watches, rings, jewellery, neckties and loose fitting clothes.

KEEP your hair away from moving parts.

PROTECT your eyes. Wear safety glasses with side shields at all times.

PROTECT your head. Wear a safety helmet when working near overhead hazards.

PROTECT your feet. Always wear safety shoes with steel toes and oil resistant soles.

PROTECT your hands. Make sure the spindle is stopped before manually changing a tool.

PROTECT your hands. Make sure the spindle is stopped before manually changing a workpiece.

PROTECT your hands. Make sure the spindle is stopped before manually clearing away swarf or oil. Use a brush or chip scraper. NEVER use your hands.

PROTECT your hands. Make sure the spindle is stopped before

manually adjusting the work piece or fixture or coolant nozzle.

PROTECT your hands. Make sure the spindle is stopped before you take measurements.

PROTECT your hands. Make sure the spindle is stopped before you move a safeguard. Never reach round a safeguard.

PROTECT your hands. Make sure the machine is switched off and electrically isolated before making any mechanical adjustment.

PROTECT your hands. Beware sharp edges of cutting tools when changing and handling tools.

PROTECT your eyes and the machine. Never use a compressed air hose to remove swarf or to clean out air vents.

Gloves are easily caught in moving parts. **TAKE THEM OFF** before you turns on the machine.

Loose objects can become flying projectiles. **REMOVE** all loose items (wrenches, chuck keys, rags etc.) from the machine before starting.

PREVENT objects from flying loose. Securely clamp and locate the work piece.

NEVER operate a machine tool after taking strong medication, using non-prescription drugs, prescription drugs or consume alcohol which may impair concentration.

ALWAYS make sure the working and cutting zone is safeguarded.

KEEP the work area well lighted. Ask for additional lighting if needed.

DON'T slip. Keep your work area clean and dry. Remove swarf, oil and obstacles.

NEVER lean on the machine. Stand away when machine is running.

DON'T get trapped. Avoid pinch points caused between other machines and the machine you are working.

PREVENT cutter breakage. Use correct cutter speed and axis feed rate for the job. Make manual over ride adjustments of axis feed rate or spindle speed if you notice unusual noise or vibration. Ask your supervisor for help if you need it.

PREVENT cutter breakage. Rotate the spindle in a clockwise direction for right handed tools, counter clockwise for left handed tools. Use the correct tool for the job.

PREVENT work piece and cutter damage. Never start the machine when the cutter is in contact with the work piece.

Dull and damaged tools break easily. Inspect tools and tool holders. Keep tools sharp. Keep overhang short.

KEEP all lubrication reservoirs maintained at the correct level. Always keep to the maintenance schedule.

Certain materials such as magnesium are highly flammable in dust and chip form. See your supervisor before working these materials.

PREVENT fire. Keep flammable liquids and materials away from the work area and from hot swarf.

PREVENT the machine from moving unexpectedly. When leaving the machine unattended, not producing, leave switched in the MANUAL mode.

DON'T use the machine in a volatile atmosphere. Electrical devices fitted to the machine are for normal factory use and are not explosion proof.

ALWAYS keep the machine clean and do not let swarf collect.

ALWAYS keep the area around the machine clean and tidy. Opening the guards creates the potential for residual coolant and swarf to fall to the swarf tray and possibly to the floor. Good housekeeping minimizes the potential for trips, slip or fall of all personnel.

INFORM all other personnel who approach the machine about the hazards described in this safety list.

When making adjustments with spanners, always ensure that the required leverage is safely applied. Always avoid slippage. Always apply the leverage by pulling, never by pushing. Always use the correct size spanner. Ensure the spanner is not damaged.

Do not use organic chemical solvents to clean the machine guards or compressed air services equipment.

The windows are manufactured from bulletproof polycarbonate sheet. This material does deteriorate with age, and should be exchanged within the time period described later in this manual.

Any workholding device used in conjunction with this machining centre must fit within the working envelope available. Under no circumstances must any such workholding device be used when it would require the need to override/defeat the safety interlocks fitted

as standard to this machine.

1.4 Safety Devices

1.4.1 Emergency Stop

Make yourself aware of the location of the emergency stop push buttons, which should be well known so that they can be operated at any time without the need to look for them. Test the push buttons periodically for their correct operation.

The emergency stop push buttons is located on the operator panel.

Hard wired over travel switches on both ends of all **3** axes to check whether the axis has traveled beyond the allowed boundary.

Once the Emergency Stop button is pressed or any of the over travel limit switches have been operated, the machine will stop immediately and the power supply to the drives is removed, and go into an Emergency Stop condition

1.4.2 Guard

Machine equipped front door, ATC door, side door and full guard as safety device to protect operator. Doors are not allowed open in any time when machining.

1.4.3 Window

Machine equipped with 9.5 mm thickness PC safety glass on front and side guard. The window impact resistance capacity is at 821.8 kg.m. Any crack on the window is not allowable.

1.4.4 Door Interlock

The machine has 1 interlocked main access door at the front. The main door is shot bolted shut and can only be opened once the spindle is stationary and there is no program running.

Power On Safety Circuit (Allows the operator to execute certain tasks whilst the front door is open)

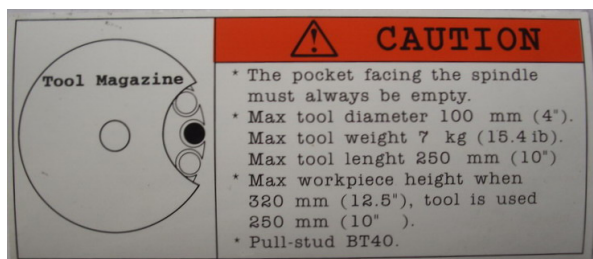
Limited machine functionality is available to the operator whilst the main door is open. The handwheel and jog keys are allowed to move the machine axes at feed rates of 1260mm/min and less. Spindle operation is prohibited whilst the main door is open as the spindle contactor is hard wired through the door interlock switch. Selection of automatic program running is prohibited until the doors are shut.

1.4.5 Cabinet door lock and switch

The main power switch of machine must be shut off and turned further CCW to open the cabinet door.

1.5 Warning Labels

Most of the warning labels are self-explained as following:



1.6 Residual Risks

The machine tool has been designed and manufactured to the highest standards, but still, your attention is drawn to the following **RESIDUAL RISKS** existing within the machine.

-
- Always check that the cutting tool product you are using is approved to run at the selected speed.
 - If non suitable cutting conditions are selected, coolant can splash, and swarf can escape over the sides of the guard.
 - Failure of the Z-axis servo motor brake could allow the head to fall when the power is OFF
 - Do not operate the machine with the side door access panels removed.
 - Isolate the machine before cleaning the machine through the side door access panels

2. Introduction

2.1 Consumption Material

2.1.1 Lubrication oil for linear rail and ballscrew

Lubrication oil for linear rail and ballscrew are as follow:

Qt'y	Recommended oil
4 liter	FEBIS K68 (ESSO) VACTRA NO.2 (MOBIL) TONNA OIL T68 (SHELL)

2.1.2 Lubrication oil for pneumatic system

Oil for pneumatic system is recommended to use same specification of ESSO TERESSO 32 or SHELL TELLUS OIL 32. Total quantity oil for machine in every half year need 120 cc.

2.1.3 Cutting fluid

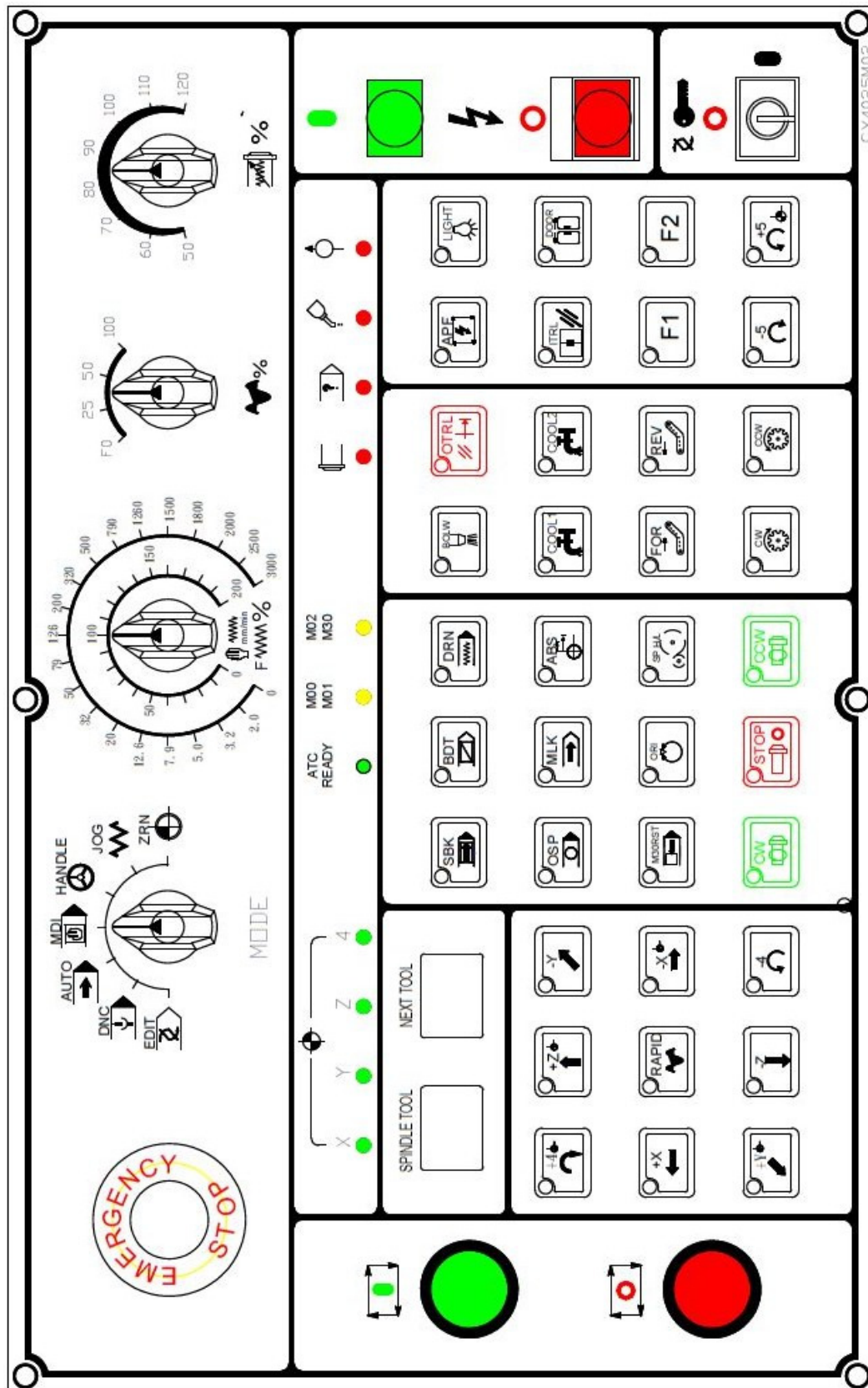
Cutting fluid and mixing ratio with water are recommended by following table. Coolant tank capacity is 160 liter.

Marker: Castrol			
No.	Type	Application	Dilution ratio with water
1	SYNTIOL-9913	Aluminum cutting only	1:15
2	ALUSBL-B	Aluminum cutting only	1:15
3	HYSOL-X	Various material cutting	1:20

2.1.4 Lubrication oil for rotary table

Lubrication oil with viscosity ISO-VG100 to 150.

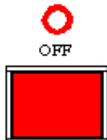
2.2 Operation Panel



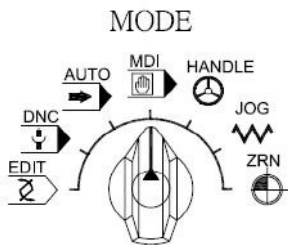
- (1) Power ON: Turn ON the power of the controller.



- (2) Power OFF: Turn OFF the power of controller.



- (3) Mode selection: From Left to right, CW.



EDIT: Program editing mode.

TAPE: PC connection mode.

AUTO: Program execution mode.

MDI: Manual Data Input mode. (single block command, tool offset, etc...)

HANDLE: Axis movement by hand wheel on Remote jog unit.

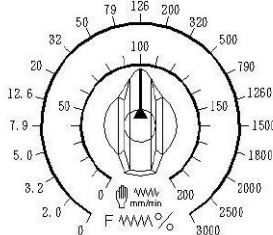
JOG: Slow movement of axis.

ZERO RETURN: Return to the zero point of each axis.

- (4) Rapid movement: Rapid moving axis in JOG mode.

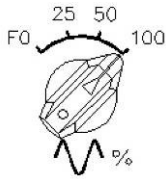


- (5) Feed rate override:



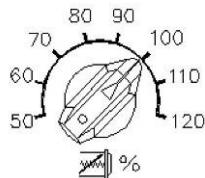
Effective for commands or program in MDI, AUTO or TAPE modes. Override from 0% to 200%. In JOG mode, the axis will move in speed ranging from 0 to 3000mm/min. (Feedrate specification A, para #11, bit 3) for JOGGING and DRY RUN.

(6) Rapid movement speed override:



Effective in modes RAPID, ZERO RETURN or the commands G00 in program execution.

(7) Spindle speed override:



(8) Over travel alarm release:



Once the axis moved over travel and machine halted, keep pressing this button and jog the axis away from travel limit. Then zero return the axis.

(9) Single block execution:



Only one block will be executed when the CYCLE START was pressed, if this switch was turned ON.

(10) Ignore marked blocks:



Blocks with "/" marked will be ignored if this switch was ON.

(11) Dry run:



In AUTO, MDI or TAPE modes, the "F" command will be overridden by JOG, if this button was ON. G00 will also be overridden if proper parameter was set.

(12) Air blow (optional):



Compressed air will be ON at blowing nozzle, if this button was ON.
The compressed air will be OFF, if there were commands M06, M00 or M01 in program.
M15 will turn ON the compressed air and M16 will turn it OFF.

(13) Work lamp:



Turn the work lamp ON or OFF.

(14) Automatic Power Off:



Machine will be automatically powered off in roughly 20 seconds (can be adjusted in diagnostic parameter) with M30 code executed, if this button was ON. But this function will be cancelled, if CYCLE START or RESET or this button was pressed before power off.

(15) Optional program halt:



M01 will be effective (program halted) if this button was ON. Need to press CYCLE START to resume program execution.

(16) Axis movement lock:



Axis movement will be halted, if this button was ON. Program keeps execution and M, S, T commands were not affected. Machine must be ZERO RETURN after this function.

(17) Coolant:



Coolant pump will be activated if this button was ON and vice versa. In AUTO mode, coolant pump will be activated by M08 command or stopped by M09 or this button.

(18) Extra coolant (optional):



Extra Coolant pump will be activated if this button was ON and vice versa. In AUTO mode, coolant pump will be activated by M51 command or stopped by M52 or this button.

(19) Door unlock(optional):



Effective in manual mode.
Open the front door if it is locked.

(20) Automatic door (optional):



Effective in manual mode.
Open and close the automatic door.

(21) F1 switch: CTS pump.



(22) F2 switch: reserved.



(23) Chip conveyor forward (optional): Effective in AUTO and manual modes.



Chip conveyor will move forward if this button pressed. Re-pressed this button will stop the chip conveyor.

(24) Chip conveyor reverse (optional) : Effective in AUTO and manual modes.



Chip conveyor will reverse if this button pressed. Re-pressed this button will stop the chip conveyor.

(25) Tool magazine CW:



Effective in manual mode.

(26) Tool magazine CCW:



Effective in manual mode.

(27) Spindle CW:



Effective in manual mode.

“S” command must be inputed in AUTO or MDI modes. Then change modes to manual and press this button. Spindle speed override can be used to adjust the spindle speed (50%-120%).

(28) Spindle STOP: Effective in manual mode.



(29) Spindle CCW:



Effective in manual mode.

“S” command must be inputed in AUTO or MDI modes. Then change modes to manual and press this button. Spindle speed override can be used to adjust the spindle speed (50%-120%).

(30) Spindle Orientation:



Effective in manual mode.

Orientate the spindle.

(31) Spindle Hi/Lo gear (optional):



Effective in manual mode.

Switch between High and Low gear.

(32) Data editing key switch:

Effective in EDIT and MDI modes.



Program, Tool data, Work coordinate data and diagnostic parameters CANNOT be edited if this switch was turned OFF.



(33) Cycle START:



Effective in AUTO mode.



In MDI mode, type in single block command and press this button to execute it.

In AUTO mode, press this button to execute the program in memory.

In TAPE mode, press this button to execute the program in memory of external devices. (PC or tape machine)

Resume the program execution which was halted by Feed HOLD.

(34) Feed HOLD:

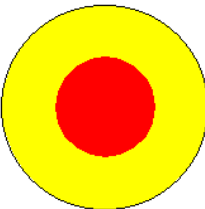


Effective in AUTO mode.



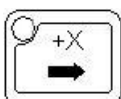
Halt the program execution: Axis movement will be stopped, yet the spindle keeps spinning.

(35) Emergency STOP:



Any mechanical movement will be stopped. Power of servo system will be cut OFF. Rotate the knob CW to release it.

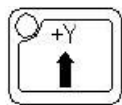
(36) +X axis movement:



Effective in JOG mode.

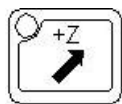
Move X axis in positive direction.

(37) +Y axis movement:



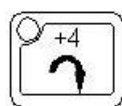
Effective in JOG and ZERO RETURN modes.
Move Y axis in positive direction.

(38) +Z axis movement:



Effective in JOG and ZERO RETURN modes.
Move Z axis in positive direction.

(39) +4 axis movement:



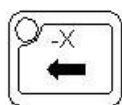
Effective in JOG and ZERO RETURN modes.
Move 4th axis in positive direction.

(40) +5 axis movement:



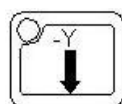
Effective in JOG and ZERO RETURN modes.
Move 5th axis in positive direction.

(41) -X axis movement:



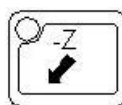
Effective in JOG and ZERO RETURN modes.
Move X axis in negative direction.

(42) -Y axis movement:



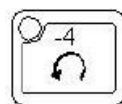
Effective in JOG mode.
Move Y axis in negative direction.

(43) -Z axis movement:



Effective in JOG mode.
Move Z axis in negative direction.

(44) -4 axis movement:



Effective in JOG mode.
Move 4th axis in negative direction.

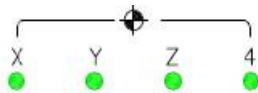
(45) -5 axis movement:



Effective in JOG modes.
Move 5th axis in negative direction.

(46) Axis ZERO point indication lamps: Lamp light up when each axis moved

to zero point.



(47) Status lamps:

ATC

• : Light up when ATC is ready.

M00

M01



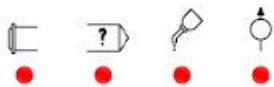
M02

M30



: Light up if the commands were executed and effective.

(48) Alarm lamps: (from left to right)



Spindle: Spindle motor over temperature or over load. Spindle speed incorrect. Spindle orientation incorrect. Fuse broken.

NC: Program error. Operation error. Over travel. Controller malfunction.

LUBE: lubrication oil level too low. (only single block execution allowed.)

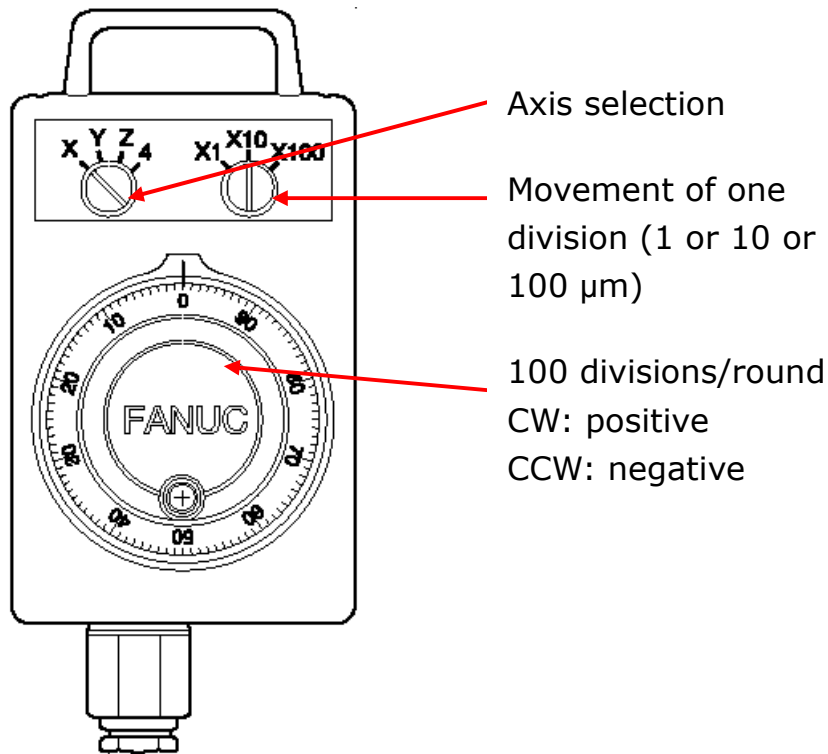
PRESS.: Low pressure of pneumatic or hydraulic system.

(49) Machine ready acknowledgement (optional):



After power ON and release of Emergency stop, this button must be pressed to acknowledge the control the machine is ready for operation, otherwise machine will not move.

2.3 Remote Jog

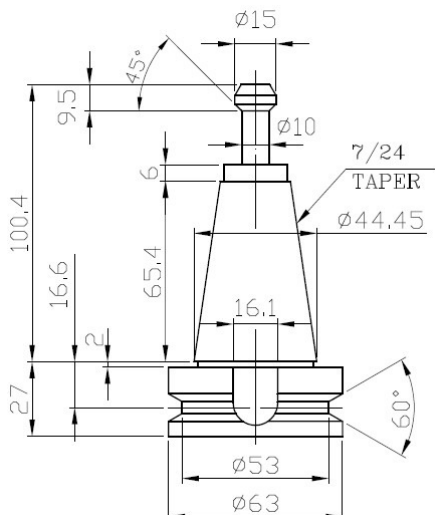


2.4 Spindle Tooling

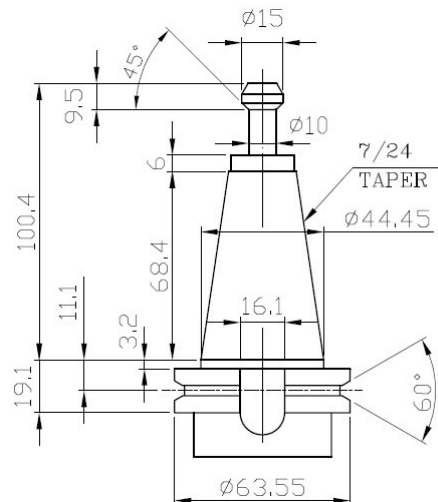
Tooling with a balance level of G2.5 or better should always be used. Failure to do so will reduce spindle life and surface finish and may invalidate the machine warranty.

For safe operation, make sure the tool holder and pull stud combination meet the standard below:

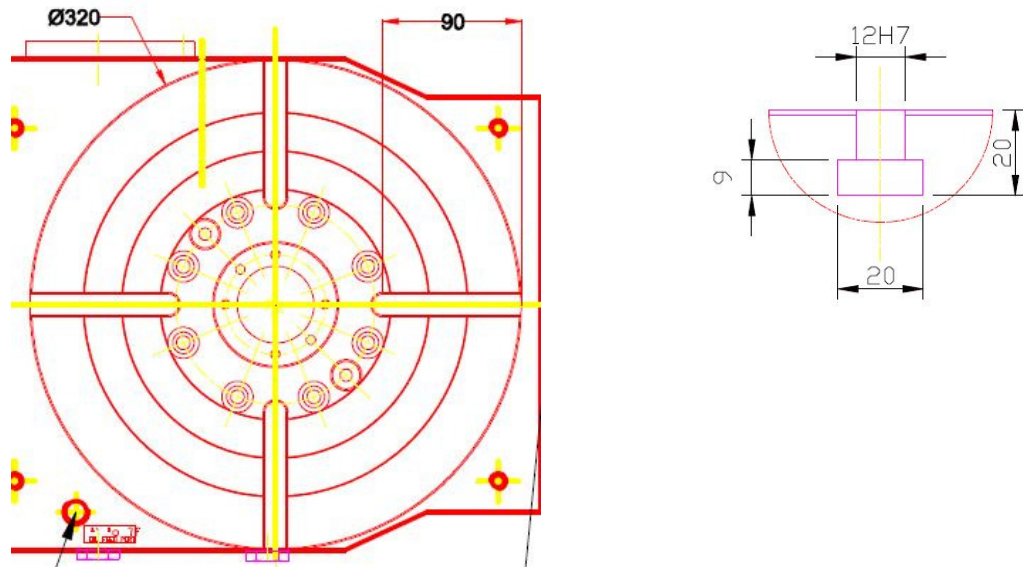
BT-40



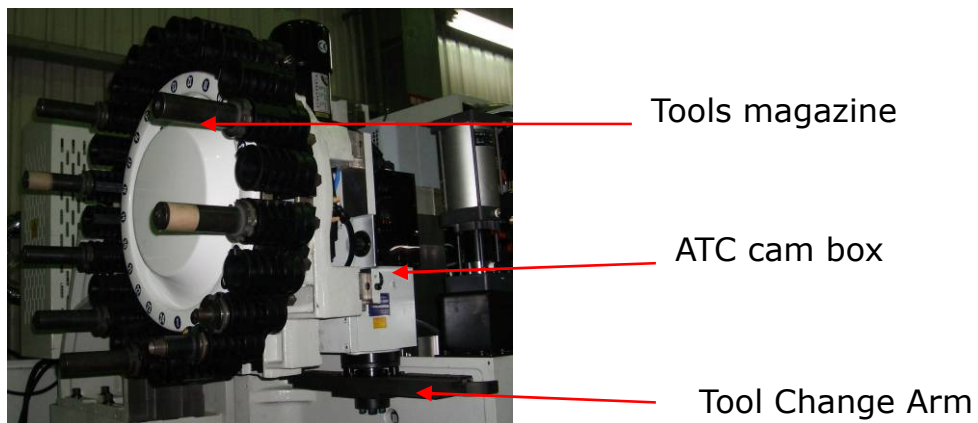
DIN-40 (CAT-40)



2.5 Dimensions of work table



2.6 Tool Magazine and ATC



2.7 Chip Removal

Chips were washed away from the interior of machine and flow into the chute where the chip screw augers or chip conveyor located. Then chips were collected at the exit of screw auger or conveyor.

3. Installation

3.1 Foundation Preparation

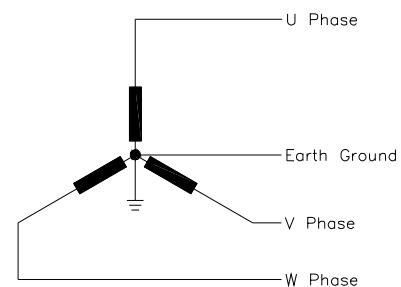
The machine should be sited on a flat area (maximum fall 3mm in 3 m) free from cracks and expansion joints.

The composition of the floor and sub-structure should be of suitable construction to bear the weight of the machine. Any friable areas should be made good using recognized building construction techniques. If doubt exists we recommend you consult your building architect.

3.2 Power Preparation

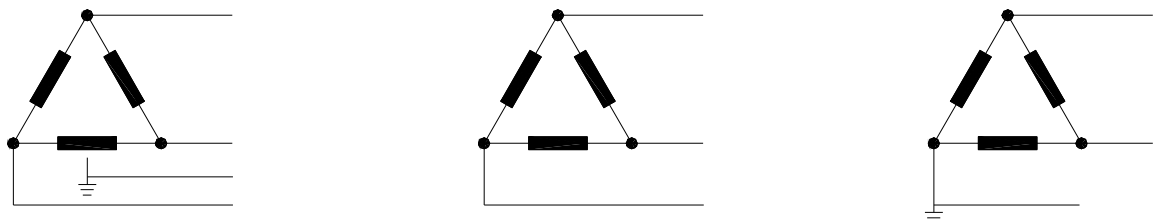
3.2.1 Line Configuration

The machine is designed to operate from a 3-phase AC incoming power source with an earth star point, as shown in the right. This incoming line short circuit current must be at least 2kA.



In other cases, such as those examples shown in figures below, an isolating transformer of 15kVA or larger capacity with an earth grounded WYE secondary is required between the incoming lines and the machine. The incoming line short circuit current must again be least 2kA.

Other Incoming Line Configurations



3.3 Unpacking

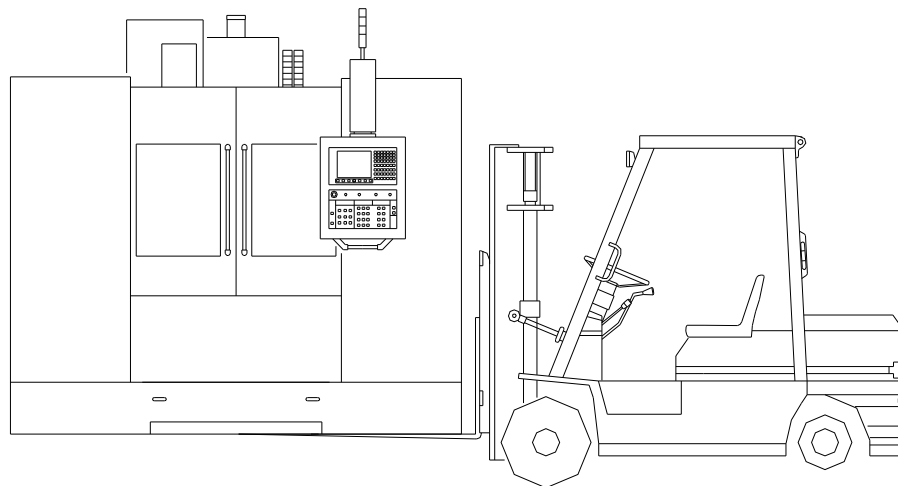
The machine was fixed on a skid during which could be pulled to the opening of container and then moved by a fork lifter.

Select a chain according to the weight of the machine. Tie the chain to the skid and make sure the connection is secured. Slowly pull the machine and monitor the gap between the machine and the wall of the container.

3.4 Machine Lifting

Any lifting cables and slings must be rated to take the machine's weight.

If the machine is to be lifted by Fork Truck, the minimum capacity should be 120% of the machine weight and with a minimum tine length of 2,000mm.



3.5 Leveling of Machine

- a) Make sure the location of the machine is exactly where you need it to be. Ensure allowance for access for operation, cleaning and maintenance is provided. See the installation dimensional drawing for minimum clearances.
- b) Locate the floor pads which are packed with the associate kit and position them on the floor under each jack bolt. When satisfied

lower the machine gently onto the pre-located pads. Ensure jack bolts are screwed down to provide a 10 to 15mm gap from the underside of the base casting to the floor.

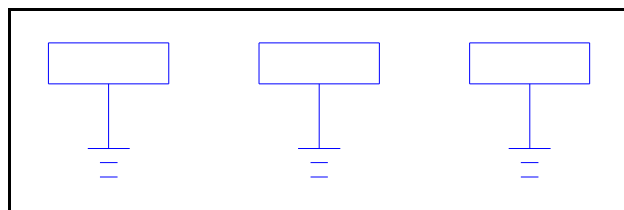
- c) If you use skates then employ the jack bolts with suitable support packing to raise the machine enough to remove the skates and finally set onto the floor pads.

3.6 Before Power ON

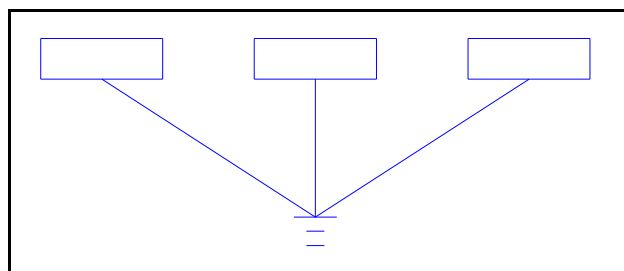
3.6.1 Grounding

- a) The machine must be grounded in order to protect personnel and the machine from electrical hazards. Grounding must be in accordance with the standards for electrical equipment.
- b) Ideally, the grounding point should be as close as possible to the machine.
- c) A qualified electrician must carry out the grounding work, otherwise serious injury, death, or accidents involving machine damage could result.
- d) The machine must be grounded in one of the following ways:

1) Independent grounding

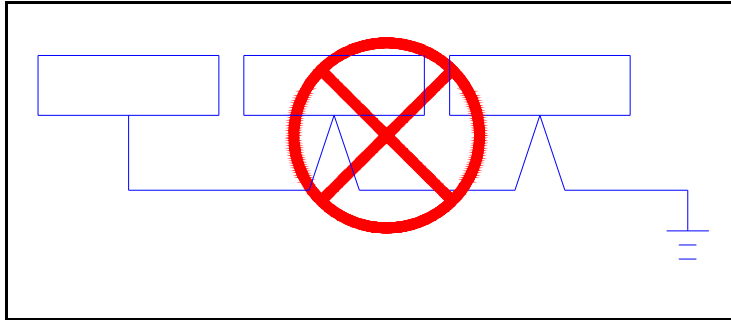


2) Common grounding



Regardless of the type of grounding system used, the earth loop impedance of the supply, which connects the machine to ground/earth, must not exceed 1 ohm.

- e) Never ground the machine in the manner shown in the illustration below.



No more than one grounding conductor wire can be connected to a single terminal. If the grounding conductors are connected in the manner shown in the illustration above, a faulty connection at one of the terminals could cause grounding current to be fed back to the machine, resulting in serious accidents.

Once the electrical and air supplies are provided make the connection to the machine. The delivery dimensional drawing gives details of input locations.

ON NO ACCOUNT MUST YOU SWITCH ON THE MACHINE.

WE PREFER YOU TO REMOVE YOUR ISOLATOR FUSES OR TRIP CIRCUIT BREAKERS.

3.6.2 Power connection

A qualified electrician should only carry out connection of the power lead to the machine.

Cables, cords or electric wires of which insulation is damaged can produce current leaks and electric shocks. Check their condition before connecting.

Ensure the power cable to the machine main isolator has sufficient current carrying capacity to handle the electric power used.

Cables which must be laid on the floor, must be protected against chips, oil and coolants penetration, which might cause damage.

In the event of power failure, turn off the main circuit breaker

immediately.

Fuses and circuit breakers should be replaced only with suitably rated alternatives. Safety devices should be replaced only with the machine manufacturers recommended parts.

Protect the CNC unit, operating panel, and electric cabinet etc from shocks which could cause a failure of malfunction.

Connect the power cable to main power terminal block. Ensure the sign rotation of R, S, T phases. Connect the ground cable to the Earth bar.



3.6.3 Misc.

Check the condition of the warning labels. If they are missing or become illegible, order replacements from your distributor according to the part number on the label plate. Do not remove warning labels.

After unpacking the machine clean all rust preventatives from the machine with a non-volatile cleaning fluid. Lightly lubricate each sliding part before trying to operate the machine. Manually operate the lubricating oil pump until oil oozes out from the slide way wipers.

Oil volume should be filled to the indicated level. Check and top up if necessary.

Use recommended oil brands and appropriate levels for all lubricating systems. See the instruction plate at the rear of the machine.

The coolant system comprises of a separate tank which houses the coolant pumps and is located beneath the front and left sides of the machine.

3.7 First Time Power ON

3.7.1 Rotation Direction of Motors

The rotation of 3-phase motors of pumps, chips removal and fans might be reversed due to the different phase sequence of city power U, V and W. Please confirm the rotation of all the coolant pumps and cooling fans.

3.7.2 Spindle Run-in

The grease inside the bearings of spindle might be concentrated by gravity due to temperature variation during the transportation and storage. It is a **MUST** to run the spindle following the procedures described in Appendix.

4. Operation

4.1 Power ON/OFF

Never turn off power during automatic operation or with the spindle or axes running unless an emergency occurs. It is better to interrupt the program by pressing the "Cycle Stop" push button. Ensure that all Emergency Stop Buttons are unlocked.

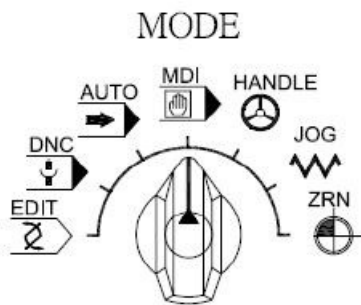
Turn the machine on at the isolator.

Press the power ON button on the control panel and the machine will take a few moments to boot up.

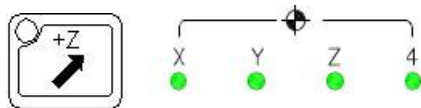


4.2 Reference (or "ZERO RETURN" or "HOME") the Machine

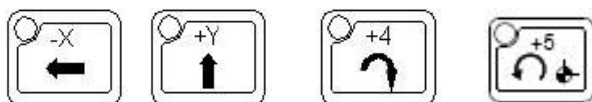
- 1) Turn the mode selection switch to ZERO RETURN.



- 2) Press +Z button, Z axis should move upward until the ZERO POINT INDICATION LAMP light up.



- 3) Press -X, +Y, +4, +5 buttons. Axes will move until the ZERO POINT INDICATION LAMP light up.



Note: If any of the Machine axes are already over the referencing point, it may be necessary to manually move the axis away in jog mode before beginning the reference procedure.

4.3 Machine Warm-up

*** If the machine is used to produce components immediately after being started, following a long idle period, sliding parts may be worn due to lack of oil and thermal expansion of the machine can jeopardize machining accuracy. To prevent this condition, always warm the machine up. ***

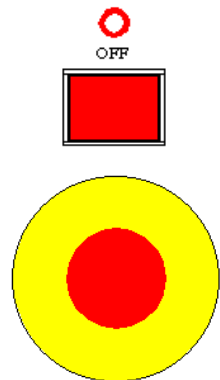
We recommend that the machine is 'Warmed up' prior to operation by running all axes for 20 minutes at the speed of actual cutting in the automatic operation mode. The spindle speed should be gradually increased up to actual cutting speed.

4.4 Spindle Warm-up

If the following procedures are not followed, spindle life will be reduced significantly. Follow the speed and running time duration in the table for each type of spindle. Please note that the duration is either in minutes (m) or in seconds (s).

4.5 Interrupting Operation

When leaving the machine temporarily after completing a job, turn off the power on the operator panel with the Emergency Stop button and turn off the main isolator.



4.6 Jobs Finished

Always clean the machine and supporting equipment down after use. Remove and dispose of chips and clean the covers and windows etc.

Return each machine component to its initial condition.

Check wipers for damage and replace if necessary.

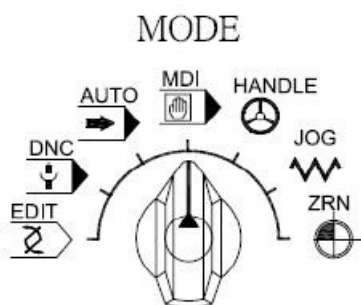
Check coolants, hydraulic oils and lubricants for level & contamination. Change them if you suspect they are contaminated.

Clean the filter on the top of the coolant tank.

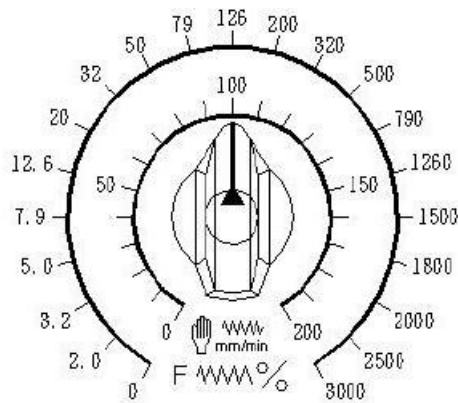
Turn off the power first on the control panel with the emergency stop button and then at the main isolator before leaving the machine at end of the shift.

4.7 Jog Axis

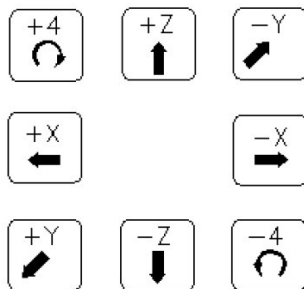
To manually jog an axis, first turn the mode selection switch to JOG mode.



Turn the axis movement override to desired speed.
(0-3000mm/min)



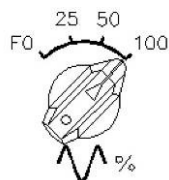
Press the button corresponding to the desired axis and direction.



For rapid movement, press the RAPID MOVEMENT button together with button of desired axis and direction.

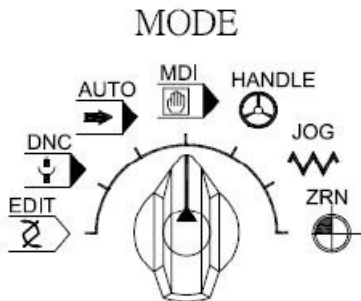


The feed rate of RAPID JOG can be overridden by RAPID MOVEMENT SPEED override. (F0% and 100% are set in parameters)



4.8 Jog Axis by MPG

To manually move axis using the Handwheel, first turn the mode selection switch to HANDLE mode. Then use the knobs and MPG on remote jog box.



4.9 Tool Loading/Unloading

In Jog or MPG mode, press DOOR UNLOCK



to unlock the guard door.

Open guard door of machine.

While holding the tool, press and hold the clamp/unclamp button on the machine head to release the tool (See illustration). Replace tool and release the button to clamp.



Close guard door of machine.

Using AUTO or MDI, load the correct tool number into the Magazine.

4.10 Large Tool management

Large tool is the tool with diameter larger than the allowable diameter as described on the label near tool magazine. This kind of tool can be used, providing the adjacent tool pots are empty.

For arm type tool changer, the tool number is independent to the pot number of magazine. Therefore a carefully management of the tool number of large tool is necessary.

In this machine, the usable tool numbers are

Standard tools: 1 through 79. (unique number)
 Large tools: 80 through 98 (unique number)
 Separator tool: 99 (virtual tools in the adjacent pots of large tool)
 No tool: 0
 These number should be input in the data table D1-D20(or D24, depending on the capacity of the tool magazine).

There was another data table D51-D70(or D74) where the tool information was stored:

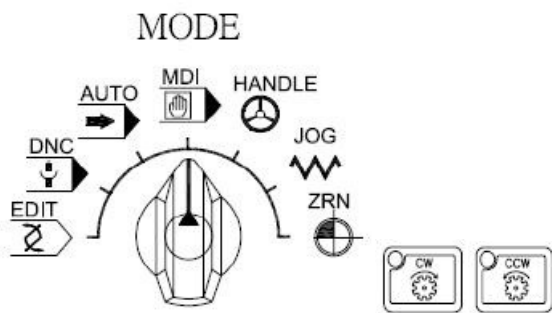
Standard tools: 33
 Large tools: 66
 Separator tool: 99
 No tool: 0

There was another data table D100-D108, where the large tool number was registered.

The tool number in spindle was logged in D457.


Procedure to input the tool information:

- 1) In HANDLE mode, press the magazine rotation button to turn the pot No.1 at the "ready pot" position. (bottom of the magazine)



- 2) Refer to the section "Parameters editing" in Appendix to enter the parameters editing screen.
- 3) DATA EDITING KEY must be turned ON.



- 4) Press 
- 5) Press softkey [**PMC**]
- 6) Press softkey [**PMCPRM**]

- 7) Press softkey [**DATA**]
- 8) Enter the tool information to related address.

Example:

Pot number	Address	Tool number	Address	Tool status
0000	D0	99	D50	99
0001	D1	8	D51	33
0002	D2	50	D52	33
0003	D3	3	D53	33
0004	D4	51	D54	33
0005	D5	52	D55	33
0006	D6	6	D56	33
0007	D7	9	D57	33
0008	D8	10	D58	33
0009	D9	2	D59	33
0010	D10	5	D60	33
0011	D11	7	D61	33
0012	D12	12	D62	33
0013	D13	13	D63	33
0014	D14	14	D64	33
0015	D15	99	D65	99
0016	D16	85	D66	66
0017	D17	99	D67	99
0018	D18	92	D68	66
0019	D19	99	D69	99
0020	D20	0	D70	0

Address	Tool status
D100	99
D101	85
D102	92
D103	0
D104	0
D105	0
D106	0
D107	0
D108	0

Address	Tool number
D457	1

5. Maintenance

DANGER!

Before carrying out any maintenance work, ensure that the machinery is switched off and disconnected from the main power supply. Also ensure that the necessary warning signs and /or locks are appointed to stop any unauthorized persons from switching the power on to the machine until the work is complete and the machinery is safe to operate.

The above warning signs or indications should be secured by a semi-permanent means with the printing clearly visible.

Only qualified and competent maintenance engineers should carry out machinery maintenance work. Working on live electrical equipment must be carried out by only suitably qualified electricians.

WARNING!

Over travel limit switches, proximity switches and interlock mechanisms including all functional parts should **not** be removed or modified.

When working in high places, use steps or a ladder which are maintained daily for safety.

Use only fuses, cable's etc. from reputable recognized manufacturers.

CAUTION!

The maintenance person should check that the machine operates safely after the work is completed. Maintenance and inspection data should be recorded and kept for reference.

5.1 Routine Inspection

5.1.1 Daily

1. Check pressure gauges for proper reading. Air pressure 5.5bar (80psi). Hydraulic pressure 68bar (986psi)
2. Check that there is sufficient oil in the air lubricator.
3. Check motors and other parts for abnormal noises.
4. Check the lubrication of sliding parts for evidence of proper lubrication.
5. Check safety covers and safety devices for proper operation.
6. Check coolant level and fill as necessary.
7. Clean dirt and chips from the axes and empty the swarf trays.

5.1.2 Weekly (In addition to daily routine)

1. Clean chips and dirt from the entire machine and wipe down.
2. Check the air filter at the rear of the electrical cabinet. Replace the filter element if it is contaminated.
3. Check all polycarbonate vision panels for signs of damage – crazing, cracking etc. or reduced visibility and replace if necessary. Contact your distributor for details.
4. Check the spindle cooler/chiller is running properly and the coolant temperature is near the temperature setting.
5. Check the spindle front draining hole from labyrinth is not jammed by dirt.
6. Check the air purging at the spindle nose. Run the spindle for 10 seconds and stop. Listen or feel the air flowing from the gap between the spindle shaft and housing.

5.1.3 Yearly (In addition to weekly routine)

1. Remove the filter from the air filter bottle and clean/replace.
2. Check spindle drive belt condition and tension.
3. Check lost motion.
4. Check the condition of the linear rail wipers.
5. Check the integrity of the electrical connections and inspect the condition of the insulation.
6. Check condition of coolant filters and replace if necessary.
7. Replace the lubrication oil in rotary table once a year.

5.2 Lubrication

5.2.1 Automatic Lubrication System

Lubricator supply 1cc oil to lubricate ballscrew once time every 15 minutes. Oil discharge volume can be adjusted by a handle and

illustration on the oil tank.

5.2.2 FRL unit

FRL unit offer air cleaning and air lubricating function. The lubricating oil discharge rate could be adjusted by a knob on FRL unit.

5.3 Cleaning

5.3.1 Machine Interior:

Chip might spatter and accumulated inside of MAGAZINE guard or somewhere that washdown coolant can't reach after machining. Oil/coolant condensation might be accumulated inside of HeadStock and effect machine operating in good condition. It needs to be check or clean out.

6. Trouble shooting

6.1 ATC system:

1. Tools falling down when arm rotating:

Tool can not be clamped well due to arm grip or stop pin is seized or arm and spindle are not aligned.

2. Emergency Stop Button was pressed during tool changing:

- 1) Release the Emergency Stop Button.
- 2) Edit the Keep Relay 5.4=1 and 5.5=1
- 3) Change the mode to HANDLE
- 4) Press CYCLE START, the tool arm will rotate CW. Press Feed Hold the tool arm will rotate CCW.

6.2 Cooling, Coolant and lubrication system.

1. Lubrication oil level too low

Refill lubrication oil into tank

2. Lubrication pressure too low

Refill lubrication oil or replace whole lubricator unit.

3. Coolant pumps noise.

Pump sealing is break down or chip materials invade into pump.

6.3 Door switch system

1. Front door is opened

Close front door or replace interlock switch

6.4 Alarm messages and remedies

Alarm No.	Alarm Message	Cause	Remedy
1010	POCKET DOWN OR UP SENSOR ERROR	The sensors of Pocket UP and DOWN are both activated.	Check the sensors on cylinder of Pocket UP & DOWN. Replace damaged one and press RESET.
1033	3 AXES NOT HOME	All three axes not in HOME position when trying to execute M06 command.	Press RESET to clear this alarm and then ZERO RETURN the axes.
1034	Z AXIS NOT HOME	Z axis not in HOME position when trying to execute M06 command.	Press RESET to clear this alarm and then ZERO RETURN the Z axis.
1035	T COMMAND >98	The tool number in T	Press RESET to clear this alarm

Alarm No.	Alarm Message	Cause	Remedy
		command is larger than 98.	then correct the tool number.
1037	T NO. NOT REGISTERED	The tool number in T command was not registered.	Press RESET to clear this alarm then correct the tool number.
1038	LOW AIR PRESSURE	As described	Check the supply of compressed air and the pressure switch.
1039	ATC NOT READY	Arm is not in Home position. Spindle not in "tool clamped" condition.	Check the sensor of arm position. Execute M87 in MDI mode to get into "tool clamped" condition. Or check the tool clamped sensor.
1040	CTS.SYS SUCK O.L	Coolant pump (including CTS system) overload.	Check any debris in the inlet of pump or any mechanical failure of pump or motors. Check the phase of power supplying through the relay. Press the RESET button on the overload relay.
1041	4TH AXIS CLAMPED	The 4th axis is still clamped while executing command to move 4th axis.	Press RESET to clear this alarm and execute unclamp command in MDI mode. Check the clamp/unclamp sensor.
1042	OIL.COOLER FAUILE	Oil cooler overload	Check any debris in the inlet of pump or any mechanical failure of pump or motors. Press the RESET button on the overload relay.
1043	NO. OF PARTS REACH	The number of parts to be machined is achieved.	Press RESET to clear this alarm.
1044	MAG POCKETS ARE FULL	The tool register table is full while trying to execute T0 command to load tool into magazine in MDI mode.	Check any empty pot in the tool register table D1-D24.
1046	ARM MOTOR FAILURE	The motor of ATC arm is overloaded or damaged.	Check any mechanical failure of motor. Press the RESET button on the overload relay.
1047	CHIP MOTOR OVERLOAD	As described.	Check any chips stocked in the chip conveyor or any mechanical failure of motor. Press the RESET button on the

Alarm No.	Alarm Message	Cause	Remedy
			overload relay.
1049	TOOL NO. DULICATED POT XX=SPDL.NO.	The tool number in the spindle is identical to the tool number registered in tool pot XX.	Correct the tool number either in the spindle or in the tool pot XX.
1050	SPINDLE OIL COOLER ERROR	As described	Check the spindle oil cooler and correct the problem following the instructions from the oil cooler manufacturer.
1051	DUPLICATE TXX IN POT YY&ZZ	The tool number is identical in tool pots YY and ZZ.	Correct the tool number either in the tool pots YY or ZZ.
1052	JIG NOT CLAMP	As described	Check the Jig.
1053	JIG NO.1 NOT CLAMP	As described	Check the Jig No. 1. (This alarm can be neglected if K13.5 set as 1)
1054	JIG NO.2 NOT CLAMP	As described	Check the Jig No. 2. (This alarm can be neglected if K13.6 set as 1)
1055	JIG NO.3 NOT CLAMP	As described	Check the Jig No. 3. (This alarm can be neglected if K13.7 set as 1)
1056	JIG NO.4 NOT CLAMP	As described	Check the Jig No. 4. (This alarm can be neglected if K14.0 set as 1)
1058	DGN. K5.4=1	K5.4 was set to 1 while trying to execute M06 (tool changing).	Set K5.4=0.
1058	DGN. K5.5=1	K5.5 was set to 1 while trying to execute M06 (tool changing).	Set K5.5=0.
1061	MAG NOT ORITATION	Tool magazine not in position.	Check the pot counting sensor or magazine home position sensor.
1062	MUST ZERO RETURN	Trying to start machining program without ZERO RETURN of the machine.	ZERO RETURN all axes before start the machining program.
1064	JIG NOT CLAMP 4TH AXIS CAN'T MOVE	4th axis cannot be moved, if the jig was not clamped.	Clamp the jig
1084	SPINDLE SPEED NOT REACH	The spindle did not reach the desired speed.	Check whether the spindle can rotate.
1085	Z AXIS MUST ZERO RETURN	Z axis must be home when moving 5th axis.	Move Z axis to the 1st or 2nd Home position.
1086	5TH AXIS CLAMPED	5 th axis is still clamped when trying to move it.	1. Press "RESET" button, execute M41 in MDI mode. 2. If this alarm stayed after executing M41, check the sensor of clamped/unclamped of 5 th axis.

Alarm No.	Alarm Message	Cause	Remedy
1087	4TH AXIS MUST ZERO RETURN	4th axis must go home when power on or releasing machine locks.	Home the 4th axis.
1088	5TH AXIS MUST ZERO RETURN	5th axis must go home when power on or releasing machine locks.	Home the 5th axis.
1091	PLEASE CHECK 4.TH AXIS TRAN.BELT	The transmission belt of tilting axis might be broken.	Check the belt of tilting axis and replace it if broken.
1100	MACHINE NOT READY	The machine ready button was not pressed, after releasing from Emergency Stop.	Press machine ready button.
2020	POCKET UP SENSOR ERROR		Check the sensor at tool detecting the tool pot up position.
2021	POCKET DOWN SENSOR ERROR		Check the sensor at tool detecting the tool pot down position.
2022	POCKET UP SOL ERROR		Check the solenoid valve or pneumatic pipe which actuates the tool pot to up position.
2023	POCKET DOWN SOL ERROR		Check the solenoid valve or pneumatic pipe which actuates the tool pot to down position.
2031	DOOR INTERLOCK		Press door unlock button.
2045	MAG MOTOR FAILURE	Overload contactor triggered	Check whether motor seized, if OK reset the overload contactor.
2048	NEED CYCLE START		Press cycle start button to execute program.
2052	PLS.PRESS TOOL UNCLAMP SW.		The tool unclamp switch must be pressed when manually changing tool.
2053	LUBE PRESSURE LOW		Check whether the oil pipes leaking or jammed.
2054	C.T.S. PUMP FAILURE	Overload contactor triggered	Check the whether the holes or hoses of CTS jammed, if OK reset the overload contactor.
2058	C.T.S FILTER TO CLOG		Check the filter, clean or replace it.
2060	TOOL UNCLAMP OVER 100000	The time spent on tool unclamping is more than 100 seconds.	Check whether the tool unclamping button jammed or the limit switch detecting tool unclamp jammed.
2061	COOLANT MOTOR NO.1 OVERLOAD	Over load contactor of head coolant motor	Check whether there is jamming or correct rotating direction at head

Alarm No.	Alarm Message	Cause	Remedy
		triggered.	coolant motor, if OK reset the overload contactor.
2062	COOLANT MOTOR NO.2 OVERLOAD	Over load contactor of chip wash down motor triggered.	Check whether there is jamming or correct rotating direction at chip wash down motor, if OK reset the overload contactor.
2070	C.T.S. PRESSURE LOW		Check whether the CTS pipes leaking.
2083	DOOR OPEN...		Shut the door closed.
2100	LUBE LEVEL LOW		Add oil into Lube reservoir.
2101	PLEASE CHANGE TO MPG MODE	Must be in MPG mode when enter tool arm maintenance mode K5.4=1 or K5.5=1	Change to MPG mode
2145	AUTO POWER OFF ON...		
2150	SUCK PUMP FAILURE	Over load contactor of suck pump motor of CTS triggered.	Check whether there is jamming at pump or incorrect rotating direction at motor, if OK reset the overload contactor.
2160	SUCK LEVEL HIGH	Level in CTS tank is too high	Check the coolant flowing in and out of CTS system.
2260	SUCK LEVEL LOW	Level in CTS tank is too low	Check the coolant flowing in and out of CTS system.

7. Appendix

7.1 Power requirements: 25 kVA

7.2 Pneumatic requirements

	Unit	Value
Pressure	bar	> 5.5
Flow rate	Litre/min	> 400
Dew point (at ATM. Pressure)	°C	-17 or lower
<p>Note: The air supply must be clean (40micron particulate size) and dry. Do not connect direct to a compressor with a short pipe as water/oil may condense out and cause a potential seizure of the spindle bearings through the air purge circuit. An air drier unit is recommended.</p>		

7.3 Spindle run-in procedures

12000 rpm		10000 rpm		8000 rpm	
Speed (rpm)	Time	Speed (rpm)	Time	Speed (rpm)	Time
1000	5 m	1000	5 m	1000	5 m
5000	3 s	5000	3 s	5000	3 s
2000	5 m	2000	5 m	2000	5 m
10000	3 s	10000	3 s	9000	3 s
3000	5 m	3000	5 m	3000	5 m
12000	3 s	--	--	--	--
4000	5 m	4000	5 m	4000	5 m
5000	5 m	5000	5 m	5000	5 m
6000	5 m	6000	5 m	6000	5 m
7000	5 m	7000	5 m	7000	5 m
8000	5 m	8000	5 m	8000	5 m
9000	5 m	9000	5 m		
10000	5 m	10000	5 m		
11000	15 m				
12000	15 m				

7.4 M-function Codes

	Function Description
M00	Program stop, spindle & coolant.
M01	Optional Program stop, spindle & coolant.
M02	End of program, spindle & coolant.
M03	Spindle run CW
M04	Spindle run CCW
M05	Spindle stop
M06	Tool change
M07	Air blast ON
M08	Coolant ON
M09	All coolants OFF
M10	4 th axis clamp
M11	4 th axis unclamp
M12	Air blast OFF
M13	Spindle CW & coolant ON
M14	Spindle CCW & coolant ON
M15	Spindle STOP and coolant OFF
M16	Door open
M17	Door close
M19	Spindle orientation
M20	Spindle orientation reset
M23	Spindle CW & air blast ON
M24	Spindle CCW & air blast ON
M25	Spindle STOP & air blast OFF
M29	Rigid-Tapping
M30	End of program, spindle & coolant, reset & rewind program
M31	Control output 1 ON, CUSTOM USE
M32	Control output 1 OFF
M33	Use timer control output 2 OFF, CUSTOM USE
M34	Use input signal control output 3 OFF, CUSTOM USE
M40	5TH AXIS CLAMP

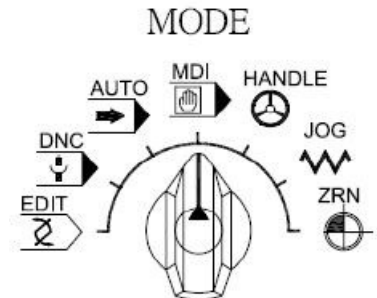
	Function Description
M41	5TH AXIS UNCLAMP
M47	Coolant Through Spindle pump ON
M48	Override cancel ON
M49	Override cancel OFF
M51	Coolant 2 ON
M52	Coolant 2 OFF
M53	Coolant Through Tool ON
M54	Coolant Through Tool OFF
M60	Put tool from spindle to magazine, carousel magazine
M61	Get tool from magazine to spindle, carousel magazine
M62	MIRROR IMAGE X OFF
M63	MIRROR IMAGE Y OFF
M65	MIRROR IMAGE 4 OFF
M66	MIRROR IMAGE 5 OFF
M67	Chip conveyor CCW
M68	Chip conveyor CW
M69	Chip conveyor OFF
M71	Pocket DOWN, arm type ATC
M72	Pocket UP, arm type ATC
M73	MIRROR IMAGE X ON
M74	MIRROR IMAGE Y ON
M76	MIRROR IMAGE 4 ON
M77	MIRROR IMAGE 5 ON
M78	MIRROR IMAGE ALL OFF
M85	Tool UNCLAMP
M86	Tool CLAMP
M89	Tool No. Arrange
M98	CALLING OF SUBPROGRAM
M99	END OF SUBPROGRAM


7.5 User Definable Parameters

7.5.1 Parameters editing

NOTE: Do not change the parameters that you do not fully understand. The warranty may be void if parameters were set incorrectly and damage the machine.

- 1) Turn the mode selection to MDI mode.



- 2) Press key 
- 3) Press soft key [**SETTING**]
- 4) Move cursor to "PARAMETER WRITE=" and type "1", then press



- 5) An alarm message "**100 P/S ALARM**" showing up, which means the parameters editing mode was ON.

SETTING (HANDY)
O0000 N00000



PARAMETER WRITE =	1	(0 : DISABLE 1 : ENABLE)
TV CHECK	= 0	(0 : OFF 1 : ON)
PUNCH CODE	= 1	(0 : EIA 1 : ISO)
INPUT UNIT	= 0	(0 : MM 1 : INCH)
I/O CHANNEL	= 0	(0-3 : CHANNEL NO.)
SEQUENCE NC.	= 0	(0 : OFF 1 : ON)
TAPE FORMAT	= 0	(0 : NO CNV 1 : F10/11)
SEQUENCE STOP	= 0	(PROGRAM NO.)
SEQUENCE STOP	= 0	(SEQUENCE NO.)

>_
S 0 T0000

MDI **** * * *
15:06:56

[補正]
[**SETTING**]
[工件]
[]
[(操作)]

Note:

- 1) To remove the "**100 P/S ALARM**" message, press  and  simultaneously.
- 2) The DATA EDITING KEY must be turned ON while editing PMC parameters.
- 3) If the message "**000 P/S ALARM**" showed up after editing parameters, the power must be cycled OFF and ON to make the modification effective.

7.5.2 Timer table

Timer NO	ADDRESS	DATA (ms)	DISCRIPTION
Timer 1	T00	20000	Chip auger ON time
Timer 2	T02	1500	Pneumatic pressure low alarm delay time
Timer 3	T04	500	Power ON delay time
Timer 4	T06	3000	Tool pocket up abnormal delay time
Timer 5	T08	3000	Tool pocket down abnormal delay time
Timer 6	T10	10000	Oil/coolant separator OFF time
Timer 7	T12	10000	Oil/coolant separator ON time
Timer 8	T14	0	Door interlock unlock time
Timer 9	T16	240000	Chip auger OFF time
Timer 10	T18	3000	CTS pressure delay time
Timer 11	T20	50	Next tool call delay time
Timer 12	T22	1500	Spindle STOP delay time
Timer 13	T24	30000	Automatic power off delay time
Timer 14	T26	500	Rigid tapping torque output delay time
Timer 15	T28	0	Coolant level high malfunction delay
Timer 16	T30	50	T code signal delay time
Timer 17	T32	0	reserved
Timer 18	T34	20000	Lubrication unit pressure abnormal delay time
Timer 19	T36	20000	Lubrication ON time after power ON
Timer 20	T38	20000	Lubrication ON time
Timer 21	T40		Tool change arm down OK delay time
Timer 22	T42		Reserved
Timer 23	T44	3000	Oil chiller abnormal delay time
Timer 24	T46		CTS filter OK delay time
Timer 25	T48		Reserved
Timer 26	T50		Reserved
Timer 27	T52		Reserved
Timer 28	T54		n/a
Timer 29	T56		Fixture Clamp delay time
Timer 30	T58		Pocket UP OK delay time
Timer 31	T60		Pocket DOWN OK delay time
Timer 32	T62		Delay time to confirm level high signal is OFF
Timer 33	T64		Gear change time
Timer 34	T66		Gear shift abnormal detection time
Timer 35	T68		Gear change duration time

Timer 36	T70		ZF gearbox oil pressure low delay time
Timer 37	T72		Delay time to confirm spindle speed achieved during cutting

7.5.3 Keep Relay list

Address	DISCRIPTION
K00.0	0: Program cannot be executed, without ZERO RETURN of axes. 1: Program can be executed, even without ZERO RETURN of axes.
K00.1	0: Display alarm message when the air pressure is low. 1: Do not display alarm message even the air pressure is low.
K00.2	0: Z axis with counter weight. 1: Z axis with pneumatic counter balance and pressure sensor.
K00.3	0: Z axis must be in ZERO position before X, Y axis start moving during ZERO RETURN by pressing CYCLE START 1: All 3 axis moving at the same time during ZERO RETURN by pressing CYCLE START
K00.4	0: Manual absolute value (ABS) is set by parameter 1: Manual absolute value (ABS) is set by control panel
K00.5	0: Accept signal of limit switches of three axis 1: Ignore signal of limit switches of three axis
K00.6	0: Mirror image can be cancelled by RESET 1: Mirror image cannot be cancelled by RESET
K00.7	0: M38 can be cancelled by M08 · M13 · M14 1: M38 cannot be cancelled by M08 · M13 · M14
K01.0	0: DOOR INTERLOCK ALARM is effective in MDI & SBK modes. 1: DOOR INTERLOCK ALARM is NOT effective in MDI & SBK modes.
K01.1	0: Coolant (M08) can be cancelled by RESET 1: Coolant (M08) cannot be cancelled by RESET
K01.2	0: Whenever there is a LUBE Alarm, spindle stop after M02 or M30 1: Whenever there is a LUBE Alarm, spindle stop immediately.
K01.3	0: Whenever there is a LUBE Alarm, spindle will be stopped. 1: Whenever there is a LUBE Alarm. Spindle will NOT be stopped.
K01.4	0: Coolant and air blow will be halted during M00/M01 1: Coolant and air blow will NOT be halted during M00/M01
K01.5	0: Signal from lubrication unit level sensor is type A. 1: Signal from lubrication unit level sensor is type B.
K01.6	0: Signal from lubrication unit pressure sensor is type A. 1: Signal from lubrication unit pressure sensor is type B.
K01.7	0: When a LUBE Alarm exists, program can be executed in single block mode. 1: When a LUBE Alarm exists, program cannot be executed.
K02.0	
K02.1	0: DO NOT display FEED HOLD with command M00 or M01. 1: Display FEED HOLD with command M00 or M01.
K02.2	0: Activate tool magazine ZERO RETURN. 1: Inactivated tool magazine ZERO RETURN
K02.3	0: Coolant cannot be activated unless spindle is rotating. 1: Coolant is independent to spindle rotating.

Address	DISCRIPTION
K02.4	0: The speed override disable is cancelled, after pressing RESET (default) 1: The speed override disable is NOT cancelled, after pressing RESET
K02.5	0: Signal from CTS pressure sensor is type A. 1: Signal from CTS pressure sensor is type B
K02.6	0: No fixture function. 1: Activate fixture functions.
K02.7	0: Ignore signal from clamp sensor of fixture. 1: Accept signal from clamp sensor of fixture.
K03.0	0: Spindle rotation is limited by fixture. 1: Spindle rotation is NOT limited by fixture.
K03.1	0: The 4th axis unclamp while modes changed. 1: The 4th axis clamp while modes changed.
K03.2	0: Display Interlock alarm (2031) when the front door was opened during program execution. 1: Display Interlock alarm (2031) when the front door was opened.
K03.3	0: Oil chiller exists. 1: No oil chiller.
K03.4	0: Ignore alarm signal from oil chiller. 1: Accept alarm signal from oil chiller.
K03.5	0: Clamp the 4th axis after power ON. 1: Unclamp the 4th axis after power ON.
K03.6	0: Signal from CTS filtering sensor is type A. 1: Signal from CTS filtering sensor is type B.
K03.7	0: Tool cleaning time defined by timer in PLC 1: Tool cleaning time NOT defined by timer in PLC
K04.0	0: Pocket DOWN after magazine rotation 1: Pocket UP after magazine rotation
K04.1	0: Flash alarm lamp 1: Rotating alarm lamp
K04.2	0: Machine Lock switch (MLK) NOT effective 1: Machine Lock switch (MLK) effective
K04.3	0: Spindle halt only in AUTO mode 1: Spindle halt in any mode
K04.4	0: Use 4 th axis clamp solenoid valve 1: Use 4 th axis unclamp solenoid valve
K04.5	0: Use 5 th axis clamp solenoid valve 1: Use 5 th axis unclamp solenoid valve
K04.6	0: with safety interlocked door 1: without safety interlocked door
K04.7	0: Inactivated 4th axis function 1: Activated 4th axis function
K05.0	
K05.1	

Address	DISCRIPTION
K05.2	
K05.3	
K05.4	0: ATC arm motor jog NOT effective (default) 1: ATC arm motor jog is effective, if pocket down, spindle oriented and Z axis in ZERO position.
K05.5	0: ATC arm motor jog NOT effective (default) 1: If K5.4=1, ATC arm motor jog is effective anyway.
K05.6	0: Tool change at 2nd Home position of Z axis 1: Tool change at 1st Home position of Z axis
K05.7	0: Tool change after all three axis at Zero position. 1: Tool change after Z axis at Zero position.
K06.0	0: Lubrication unit controlled by external timer 1: Lubrication unit controlled by PLC
K06.1	0: Lubrication unit with pressure sensor 1: Lubrication unit without pressure sensor
K06.2	0: Signal from tool arm is type B. 1: Signal from tool arm is type A.
K06.3	
K06.4	0: Signal from magazine counter is type B. 1: Signal from magazine counter is type A.
K06.5	0: Arm down brake controlled by external timer 1: Arm down brake controlled by PLC
K06.6	
K06.7	
K07.0	0: Air blow not stopped by M09 1: Air blow by M09
K07.1	0: Reverse the chip auger by pressing reverse button. 1: Reverse the chip auger by pressing forward button first, then reverse button.
K07.2	
K07.3	
K07.4	
K07.5	
K07.6	
K07.7	
K08.0	
K08.1	
K08.2	0: Spindle stopped if air pressure low alarm existed 1: Spindle NOT stopped even if air pressure low alarm existed

Address	DISCRIPTION
K08.3	
K08.4	
K08.5	
K08.6	
K08.7	
K09.0	
K09.1	
K09.2	
K09.3	0: CTS function inactivated 1: CTS function activated
K09.4	
K09.5	0: Jog speed limited if front door opened 1: Jog speed NOT limited even if front door opened
K09.6	0: Safety interlock will be unlocked, if M00 or M01 executed. 1: Safety interlock will NOT be unlocked, even if M00 or M01 executed.
K09.7	0: Safety interlock will be unlocked, if M02 or M30 executed. 1: Safety interlock will NOT be unlocked, even if M02 or M30 executed.
K10.0	
K10.1	
K10.2	
K10.3	
K10.4	
K10.5	
K10.6	
K10.7	0: 5 th axis function inactivated 1: 5 th axis function activated
K14.0	
K14.1	0: CTS tank level high switch NO type 1: CTS tank level high switch NC type
K14.2	0: CTS tank level low switch NO type 1: CTS tank level low switch NC type
K14.3	0: Monitoring CTS tank level 1: NOT monitoring CTS tank level
K14.4	
K14.5	0: Monitoring spindle speed while cutting (setting together with parameter 3708#0 1: NOT Monitoring spindle speed while cutting (setting together with parameter 3708#0
K14.6	0: Monitoring CTS output pressure switch 1: NOT monitoring CTS output pressure switch

Address	DISCRIPTION
K14.7	0: Z axis must return to 1 st or 2 nd home point before 5 th axis movement. 0: Z axis DO NOT return to 1 st or 2 nd home point before 5 th axis movement.
K15.0	0: 5 th axis unclamp while operation mode changed. 1: 5 th axis NOT unclamp while operation mode changed.
K15.1	0: 5 th axis clamp while power ON. 1: 5 th axis unclamp while power ON.
K15.2	0: 4 th axis must go home after power ON 1: 4 th axis DO NOT NEED to go home after power ON
K15.3	0: 5 th axis must go home after power ON 1: 5 th axis DO NOT NEED to go home after power ON
K15.4	
K15.5	
K15.6	
K15.7	

7.6 Machine floor space

7.6.1 MRU-32

